Inscribed angles of circles

In this lesson we'll look at inscribed angles of circles and how they're related to arcs, called intercepted arcs.

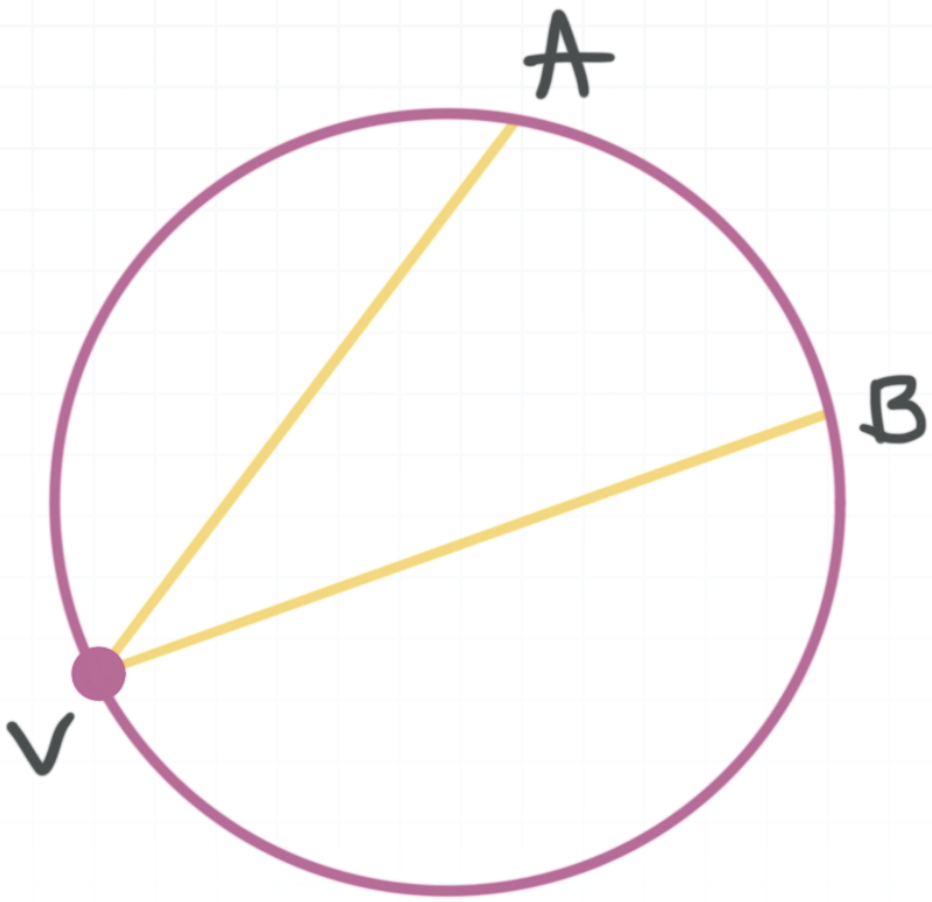
Chord of a circle

A chord is a straight line segment that has endpoints on the circumference of the circle. The diameter of a circle is a special type of chord that passes through the circle's center. The yellow line is an example of a chord.

Inscribed angle

© Krista King Math

An inscribed angle is formed by two chords. These chords share the vertex of an angle. The arc that touches the endpoints of the chords is called the intercepted arc.



Angle AVB is an inscribed angle and arc AB is the intercepted arc.

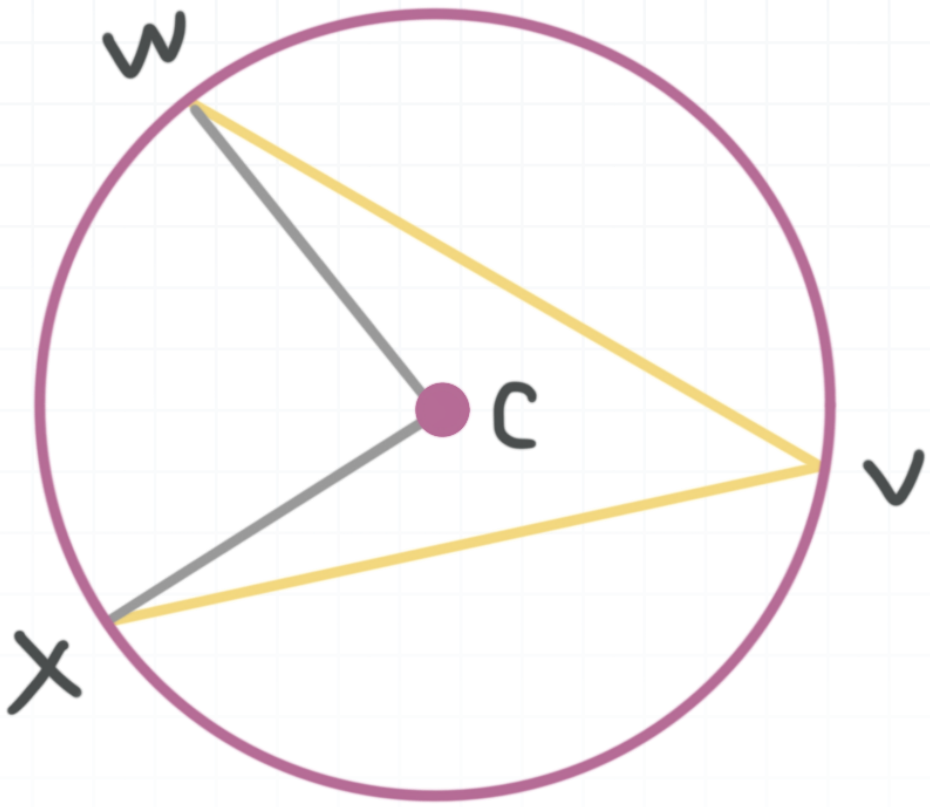
Measures of inscribed angles, central angles and intercepted arcs

The measure of an intercepted arc is equal to the measure of its central angle.

The measure of an inscribed angle is equal to half the measure of the central angle that goes with the intercepted arc.

© Krista King Math

The measure of an inscribed angle is equal to half the measure of its intercepted arc.



$$m\overset{\frown}{WX} = m\angle WCX$$

$$\frac{1}{2}m\angle WCX = m\angle WVX$$

$$\frac{1}{2}m\overset{\frown}{WX} = m\angle WVX$$

We can do some algebra to show that the following is also true.

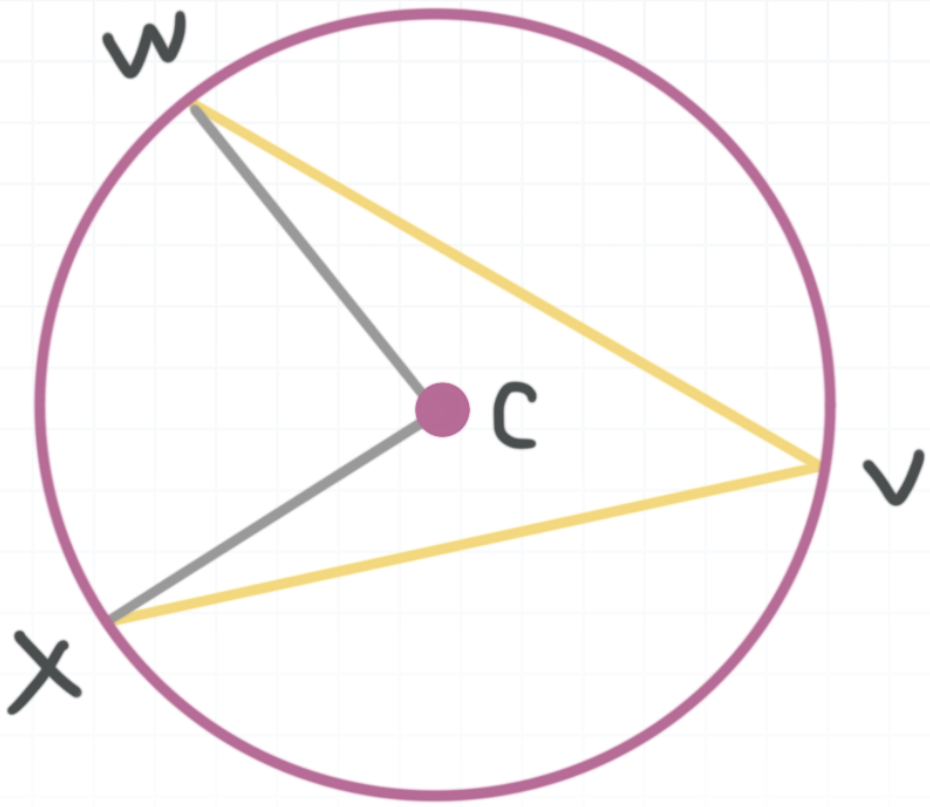
$$m\angle WCX = \frac{1}{2}m\overset{\frown}{WX} = \angle WCX = 2m\angle WVX$$

Let's do a couple of example problems.

Example

© Krista King Math

Find the measure of the inscribed angle WVX if $m\angle WCX = 88°$.



$\angle WCX$ is the central angle for the intercepted arc $\overset{\frown}{WX}$. This means the inscribed angle measures half of the measure of $\angle WCX$. We know

$$\frac{1}{2}m\angle WCX = m\angle WVX$$

and

$$m\angle WCX = 88°$$

So

$$\frac{1}{2}(88°) = m\angle WVX$$

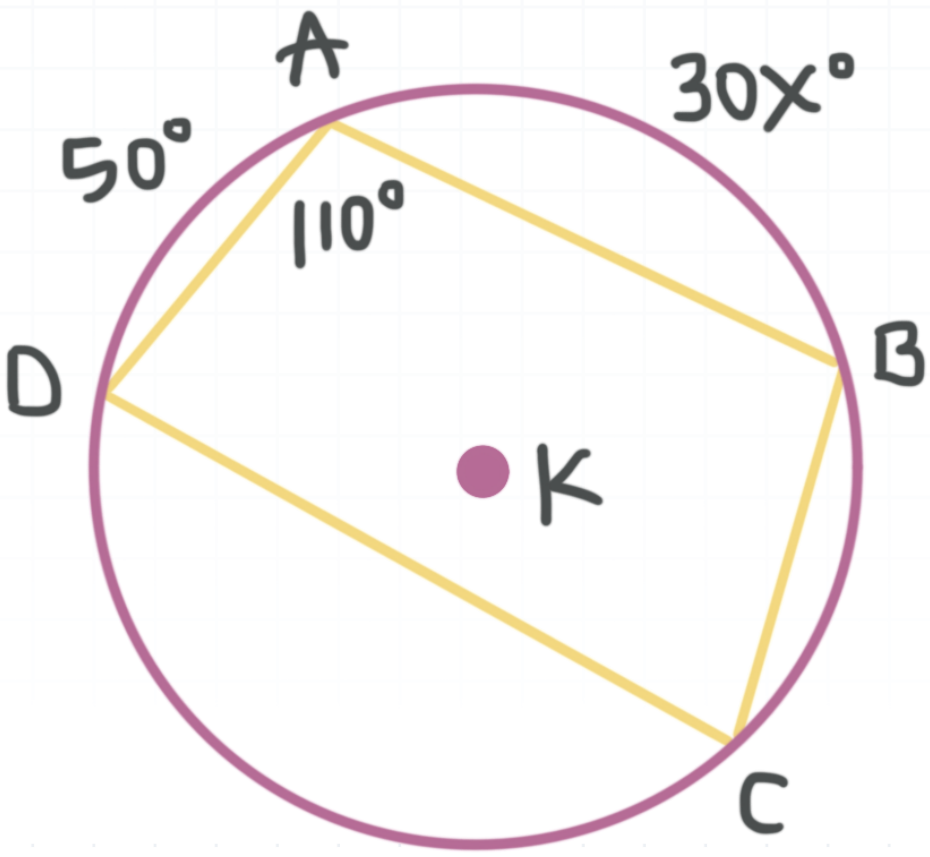
$$44° = m\angle WVX$$

© Krista King Math

Let's do a problem with a few more steps.

Example

Solve for x.



The full circle is $360°$. If we can find the measure of arc DB, we can set up an equation to solve for x, because $m\overset{\frown}{DB} + m\overset{\frown}{BA} + m\overset{\frown}{AD} = 360°$, and we know that $m\overset{\frown}{BA} = 30x$ and $m\overset{\frown}{AD} = 50°$.

From the diagram we can see that $m\angle DAB = 110°$. The intercepted arc that belongs to this angle is arc DB. The intercepted arc has a measure of twice the inscribed angle.

© Krista King Math

$$m\overset{\frown}{DB} = 2m\angle DAB = 2(110^\circ)$$

$$m\overset{\frown}{DB} = 220^\circ$$

Now we can use the equation we wrote earlier to solve for x.

$$m\overset{\frown}{DB} + m\overset{\frown}{BA} + m\overset{\frown}{AD} = 360^\circ$$

$$220^\circ + 30x + 50^\circ = 360^\circ$$

$$270^\circ + 30x = 360^\circ$$

$$30x = 90^\circ$$

$$x = 3^\circ$$

© Krista King Math